REMARKS

Claims 1, 18 and 20 are pending and stand ready for further action on the merits. No new matter has been added by way of the above-amendment.

Advantages of the Present Invention

The present invention is drawn to:

a powder Raney catalyst obtained by

(i) melting nickel and aluminum,

(ii) quenching droplets of said melted mixture by means of dropping them onto chilled water through a nozzle to obtain a quenched lump alloy,

(iii) optionally breaking the quenched lump alloy,

(iv) classifying and activating the alloy of step (ii) or (iii),

(v) using said alloy of step (iv) as a Raney catalyst in a hydrogenation reaction,

(vi) collecting said alloy of step (v),

(vii) crushing said Raney catalyst used in the hydrogenation reaction into powder, and optionally

(viii) reactivating the powdered catalyst.

In other words, the present invention relates to recyclable lump form Raney catalyst and to powder type Raney catalyst obtained by reactivating used lump form Raney catalyst.

The present invention is characterized in that the powder type Raney catalyst is consistently obtained as a highly active powder type Raney catalyst by reusing used lump form Raney catalyst no matter how many hydrogenation cycles it has been exposed to. In other words, used lump form Raney catalyst can be reused as raw material for powder type Raney catalyst whether the catalytic activity of the used lump form catalyst remains or not. Moreover, the thus obtained powder type Raney catalyst is available with as high catalytic activity as the conventional Raney catalyst has, even though the powder type catalyst has been obtained from the used catalyst.

A cross-sectional view of an activated lump form Raney catalyst of the present invention has been enlarged by a scanning electron microscope (PHOTO 1, see the attached).

This photograph is evidence that the activated lump form Raney catalyst has different layers. The outer layer which appears bright in the photograph represents an activated catalyst whereas the inner layer which appears relatively dark represents the inactive form of the catalyst. Thus, there is a large amount of lumped inactivated catalytic alloy (nickel-aluminum alloy) inside the

activated catalytic layer. The inactive layer is possible, since the alkali solvent, such as an aqueous sodium hydroxide solution, is prevented from penetrating into the core of the particle by the active surface layer.

The lump form Raney catalyst which has an evenly thick active surface layer of the catalytic alloy will lose its activity upon repeated use as a hydrogenation catalyst. However, the catalytic alloy existing inside of the used lump form Raney catalyst can be activated by crushing the lump catalyst, thereby exposing the inactive inner layer followed by activation treatment with an alkali solution.

The above-explanation has been provided for the Examiner's sake to help the Examiner appreciate the patentable distinctions between the present invention and the cited references. We now discuss the cited references individually.

Diffenbach et al., US 3,719,732 and Lepper et al., US 4,520,211

Claims 5, 8 and 19 are rejected under 35 U.S.C. §102(b) as anticipated by or, in the alternative under 35 U.S.C. §103(a) as obvious over Diffenbach et al.; **and** claims 1, 18 and 20 are rejected under 35 U.S.C. §103(a) as being unpatentable over Diffenbach et al. in view of Lepper et al.

Applicants respectfully traverse each of the rejections.

The Examiner appears to agree with Applicants' arguments in the September 27, 2001 amendment, that Diffenbach et al. fail to teach or suggest that the catalyst can be crushed and optionally reactivated. Since claims 5 and 8 and 19 have been cancelled without prejudice, the presently claimed invention is patentably distinct from the teachings of Diffenbach et al. taken alone.

The Examiner, aware of the deficiencies of Diffenbach et al. cites Lepper et al. in order to cure the deficiencies of Diffenbach et al. Applicants note from the paragraph bridging pages 5-6 of the outstanding Office Action, that the Examiner has cited Lepper et al. for teaching that the "particle size of the catalyst employed in lumpy form may vary widely."

Applicants respectfully submit that Lepper et al. **teach away** from using a catalyst in the powder form. In column 3, lines 16-32, Lepper et al. teach that the "catalyst particles should not be so small that the flow resistance of the catalysts solid bed greatly hinders the through-flow of the charged mixture of hydrogen and aqueous carbohydrate solution and necessitates to high a pressure."

A reference which leads one of ordinary skill in the art away from the claimed invention cannot render it unpatentably obvious. *Dow Chem. Co. v. American Cyanamid Co.* 816 F2d 617, (CAFC 1987). In determining the scope and content of the prior art, and

determining whether the prior art suggested the claimed invention, the references "must be read as a whole and consideration must be given where the references diverge and teach away from the claimed invention." *Akzo N.V. v. United States Int'l Trade Comm'n* , 1 USPQ2d 1241, 1246 (Fed. Cir. 1986); *In re Fine*, 5 USPQ2d 1596, 1598-99 (Fed. Cir. 1988).

In addition, Lepper discloses lump catalyst in which metal ruthenium is carried on a carrier material such as activated carbon. On the other hand, the product of the present invention is made from lump Raney catalyst obtained from metal molten and quenched in water. In other words, the inventive catalyst essentially consists only of alloy components, and does not contain a "carrier" which gives no direct contribution to the hydrogenation reaction.

Lepper's catalyst, containing a "carrier" which gives no direct contribution to the hydrogenation reaction, is obviously poorer in reactional efficiency per unitary weight of catalyst than that of the present invention essentially consisting only of catalyst alloy components.

Even assuming arguendo that the catalyst as disclosed by Lepper could be once used and then, milled to get powder Raney catalyst as in the present invention, in such a case, the catalyst contains a "carrier" which gives no direct contribution to the

hydrogenation reaction. Therefore, thus obtained powder Raney catalyst is **obviously poorer** in hydrogenating efficiency than that of the present invention.

Also, Applicants respectfully submit that Diffenbach et al. **teach away** from using a powder catalyst, see column 2, line 57 to column 3, line 35. Diffenbach et al. state that it is an object of their invention to shape the catalyst prior to activation. The type of alloy is chosen to minimize the possibility that the catalyst particles "will crush to a powder consistency... and that the particles would not be entrained in the product stream."

As pointed out in the response to the previous Office Action, it is important in Diffenbach's invention to obtain a catalyst in a hollow shape. This means that attention is focused on larger superficies of grained catalyst in Diffenbach's invention to obtain highly active catalyst. Then, the catalyst should preferably be irregularly shaped as shown in Figs. 4 and 5 of the patent. Incidentally, those skilled in the art would readily know that grains should be shaped rather irregularly than uniformly to obtain larger superficies. From this point of view, grains, uniformly shaped to have smaller superficies, are not preferred in Diffenbach's invention.

On the other hand, powder Raney catalyst of the present invention is made from used lump Raney catalyst by reusing

catalytic components remaining in the same used lump Raney catalyst. Thus, irregular shapes are not preferred for the inventive lump Raney catalyst in order that catalytic components, remaining in the lump catalyst, can be collected effectively and recycled easily. Such irregular shapes are disadvantageous in the present invention where the catalyst remaining in the grains is used again after once having been used as a hydrogenation catalyst.

Obviously, as explained above, to reuse catalytic components remaining in the used catalyst would be difficult from Diffenbach's invention where irregular shapes of catalyst are preferred for highly active grained catalyst. Irregular shapes of catalyst in Diffenbach's invention greatly harm recyclability of lump Raney catalyst as disclosed in the present invention. Thus, Diffenbach's catalyst is totally different from that of the present invention.

Furthermore, the Examiner indicates that the teachings of Lepper et al. overlap with the present invention in that Lepper et al. teach that the catalyst particles are formed in a range of 2 to 10 millimeters. According to the Examiner, this "range overlaps with the claimed range." Applicants respectfully submit that this is true with respect to the size of the quenched droplets described in present claim 20, however, Lepper et al. fail to teach or suggest the advantages of a crushing step wherein the Raney

catalyst is crushed to form a powder as required by inventive claim 1 and 20.

Accordingly, the combination of Diffenbach et al. and Lepper et al. fail to teach or suggest the recyclability of the present catalyst which is a feature of the present invention as claimed. According to the MPEP, a *prima facie* case of obviousness can not be said to exist unless all of the limitations of the presently claimed invention are either taught or fairly suggested. See MPEP § 2143.03. As such, withdrawal of each of the rejections is respectfully requested.

Schuetz et al., US 5,536,694, Raney US 1,628,190, Richter US 3,673,116 and Lepper et al.

Claims 1 and 20 are rejected under 35 U.S.C. §102(e) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Schuetz; **and** claims 1, 5, 8[1], and 18-20 are rejected under 35 U.S.C. §103(a) as being unpatentable over Schuetz et al. in view of Raney and optionally further in view of Richter and Lepper et al.

Applicants respectfully traverse each of the rejections.

[1] The Examiner incorrectly included cancelled claims 9-10 in this rejection.

Applicants note from the paragraph bridging pages 9-10 of the outstanding Office Action, that **the Examiner has withdrawn the rejection based on the inventive disclosure of Schuetz et al.**; however, the Examiner has maintained the rejection based on the prior art section of Schuetz et al.

The present invention relates to powder Raney catalyst made from and obtained by reusing used lump Raney catalyst. Therefore, used lump Raney catalyst as a raw material must have, in the remaining portion, a catalytic layer recyclable to make powder Raney catalyst.

However, this point is not described nor suggested in the prior art section of Schuetz. As noted above, all the elements must be either taught or fairly suggested by the prior art in order to establish a *prima facie* case of anticipation or obviousness. See MPEP §§ 2131 and 2143.03. Since Schuetz et al. fail to teach or suggest that the remaining portion in the lump Raney catalyst is recyclable to make a powder Raney catalyst, the *prima facie* case of anticipation or obviousness over Schuetz et al. is not tenable.

In addition to the above, one of the requirements of a reference cited under 35 U.S.C. §103 is that the disclosure must enable the skilled artisan to make or use the aspect of the product or process which the Examiner is using to find the inventive product or process obvious, see MPEP § 2121.01. Applicants

respectfully submit that the prior art section of Schuetz et al. fail to meet this requirement. Furthermore, the cited secondary references fail to cure this deficiency.

Ultimately, the test for enablement involves a ***balancing*** of each of the factors set forth in *In re Wands*, 8 USPQ2d 1400 (Fed. Cir. 1988), i.e.,

1. the quantity of experimentation necessary (time and expense),
2. the amount of direction or guidance presented in the application,
3. the presence or absence of working examples of the invention in the application,
4. the nature of the invention,
5. the state of the prior art,
6. the relative skill of those in the art,
7. the predictability or unpredictability in the art, and
8. the breadth of the claimed invention. *Id* at 1404.

Applicants respectfully submit that upon properly balancing each of these factors, it would be clear that the skilled artisan would require undue burden to make (by crushing) and reactivate the powdered catalyst of the prior art section of Schuetz et al. and use the powdered catalyst in a catalytic reaction.

For a prior art reference to be enabling, it must explain how to make and use the invention to one of ordinary skill in the art. The person of ordinary skill is fictitious. As stated by the Federal Circuit, "[w]ith the involved facts determined, the

decision maker confronts a ghost, i.e., 'a person having ordinary skill in the art,' not unlike the 'reasonable man' and other ghosts in the law." *Panduit Corp. v. Dennison Mfg. Co.*, 1 USPQ 2d 1593, 1595-96 (Fed. Cir.), cert. Denied, 481 U.S. 1052 (1987).

When determining the level of ordinary skill, the Federal Circuit has also commented as follows:

> The person of ordinary skill is a hypothetical person who is presumed to be aware of all the pertinent prior art. The actual inventor's skill is not determinative. Factors that may be considered in determining level of skill include: type of problems encountered in art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field. Not all such factors may be present in every case, and one or more of them may predominate. *Custom Accessories Inc. v. Jeffrey-Allan Indus.*, 1 USPQ 2d 1196, 1201 (Fed.Cir. 1986).

Applicants respectfully submit that there is a high level of skill deemed to be held by "one of ordinary skill" in the catalysis art. The skilled artisan would typically have a Ph.D. or a Master's degree with several years of experience.

In addition, the skilled artisan is aware that the catalytic arts are inherently unpredictable. As stated by the CCPA, "[w]e note that many chemical processes, and catalytic processes particularly, are unpredictable, ... and that the scope of enablement varies inversely with the degree of unpredictability involved."

Id., 190 USPQ at 218 (citing *In re Mercier*, 185 USPQ 774, 779 (C.C.P.A. 1975); *In re Fisher*, 166 USPQ 18, 24 (C.C.P.A. 1970).

In the instant case, the ***prior art section*** of Schuetz et al. does not include any experimental evidence for guiding the skilled artisan to use the powdered catalyst in a catalytic reaction. In addition, there is no teaching of how the crushing step and the reactivation step would be performed. Clearly, the determination of how to make and use the catalyst in the ***prior art section*** of Schuetz et al. would be overly burdensome. Therefore, upon balancing each of the factors set forth in Wands, the ***prior art section*** of Schuetz et al. does not enable the skilled artisan under Section 112, first paragraph to make and use the present recyclable catalyst.

Based on the above-discussion, withdrawal of the rejections are respectfully requested.

CONCLUSION

In view of the above-amendments and comments, Applicants respectfully submit that the claims are in condition for allowance. A Notice to such effect is earnestly solicited.

If the Examiner has any questions concerning this application, she is requested to contact Garth M. Dahlen, Ph.D. (#43,575) at (703) 205-8000 in the Washington, D.C. area.

Pursuant to 37 CFR 1.17 and 1.136(a), the Applicants respectfully petitions for a three (3) month extension of time for filing a response in connection with the present application and the required fee of $460.00 is being filed with the Notice of Appeal.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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RCS/GMD/gh
1984-0105P

Attachment: Version with Marking to Show Changes Made

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claims 5, 8 and 19 have been cancelled.

SEM photography of lump form Raney catalyst of the present invention
Measuring device: HITACHI S-2460N
Enlargement ratio: 50 times